

## Equities vs. Gilts: 118 Years of UK Market Data

### Summary

- The last two years have both been strong for equities despite heightened political uncertainty. Gilts performed well in 2016 as the UK base rate reached its lowest ever level, but did not do so well in 2017.
- While annual equity returns are slightly negatively skewed, annual gilt returns display a positive skew.
- The current nominal and real values of an investment of £100 placed in 1900 differ hugely for both equities and gilts. A £100 investment in equities, for example, would be worth over £2.9 million now in nominal terms but just £35,000 in real terms.
- Equities exhibit greater volatility of annual returns than gilts, but over longer time horizons, the volatility of annualised real returns of equities falls below that of gilts.
- A portfolio comprising 50% equities and 50% gilts often displays less volatility than both an entire portfolio of equities and an entire portfolio of gilts. This is due to the diversification benefit arising from the less than perfect correlation.
- Despite the diversification benefit offered by the combined portfolio, the 100% equity portfolio still provides superior risk-adjusted returns over all time horizons.

### Introduction

The long term history of equity and gilt prices is a fascinating topic, and one which provides plenty of insight into market behaviour. It also forms the basis of many ideas in modern portfolio theory. We refresh our analysis on the topic periodically, and up to 2015 we sourced our data from the Barclays Equity Gilt Study, an annual publication from Barclays which provides comprehensive historic UK equity and gilt returns data from 1899. For this update, we have retained the Barclays data for all years up to 2015 but we have sourced the 2016 and 2017 data from Bloomberg.

### Inflation and interest rates

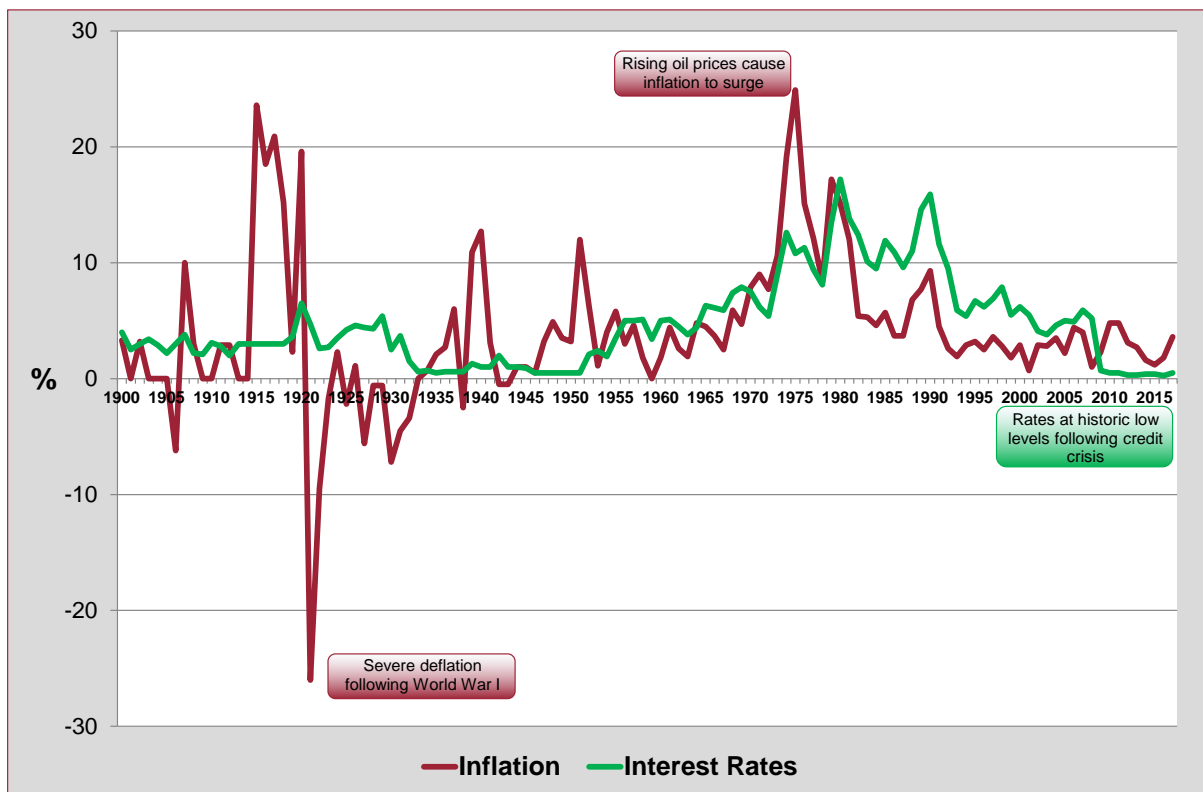
We start with an overview of inflation and interest rates. Both of these key economic metrics can impact the price of equities and bonds. Figure 1 shows the historic inflation and interest rates since 1900<sup>1</sup>.

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<sup>1</sup> Inflation in the Barclays Equity Gilt study was measured using the Retail Price Index since 1914, so we have continued to use that. Interest rates up to 2015 are measured using a UK Treasury Index from the Barclays study – we have used the Bank of England base rate for 2016 and 2017.



**Figure 1: Inflation and interest rates since 1900**



Source: Barclays & Courtiers.

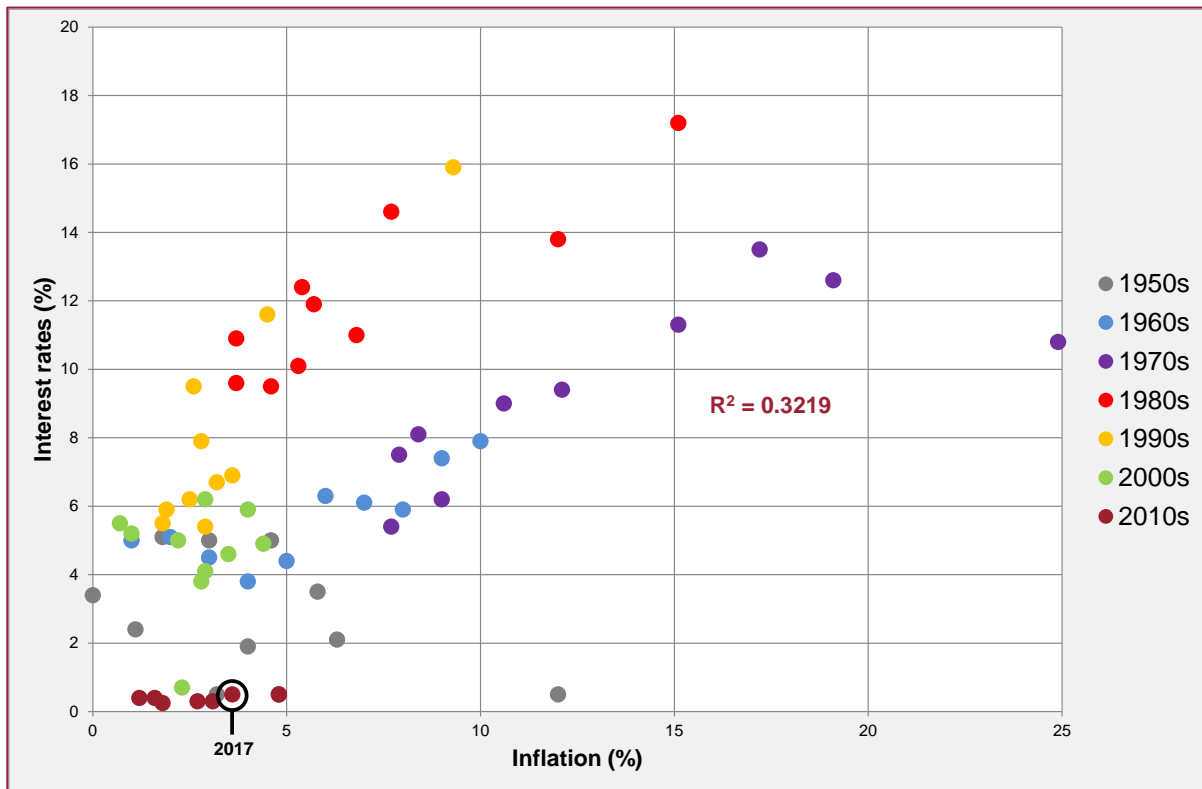
Inflation varied wildly in the early 20<sup>th</sup> century. It rose to very high levels during World War 1 and then crashed to deflationary levels in the years that followed and stayed low during the depression of the early 1930s. Since the end of World War 2 inflation has stayed positive, particularly in the early 1970s when oil prices surged.

Interest rates also peaked during the 1970s, but have been declining for the last twenty-five years. When the financial crisis occurred a decade ago, the Bank lowered interest rates to historic low levels, and they have remained there ever since.

Interest rates are typically linked to inflation. Figure 2 plots to two variables against each other for the 1950s onwards.



**Figure 2: Inflation versus interest rates since 1950**



Source: Barclays & Courtiers.

There is a moderate correlation between the two variables, as indicated by the  $R^2$  value of 32.19%. This means that 32.19% of the variation in interest rates can be explained by the inflation rate<sup>2</sup>.

## Equities

Equities, or stocks, form the bread and butter of the investment universe. They are perceived as the riskier of the two major asset classes, as when a company runs into trouble it is the shareholders that are hit before the bondholders. In return for the added risk assumed by equity investors, there is far greater – theoretically unlimited – upside potential.

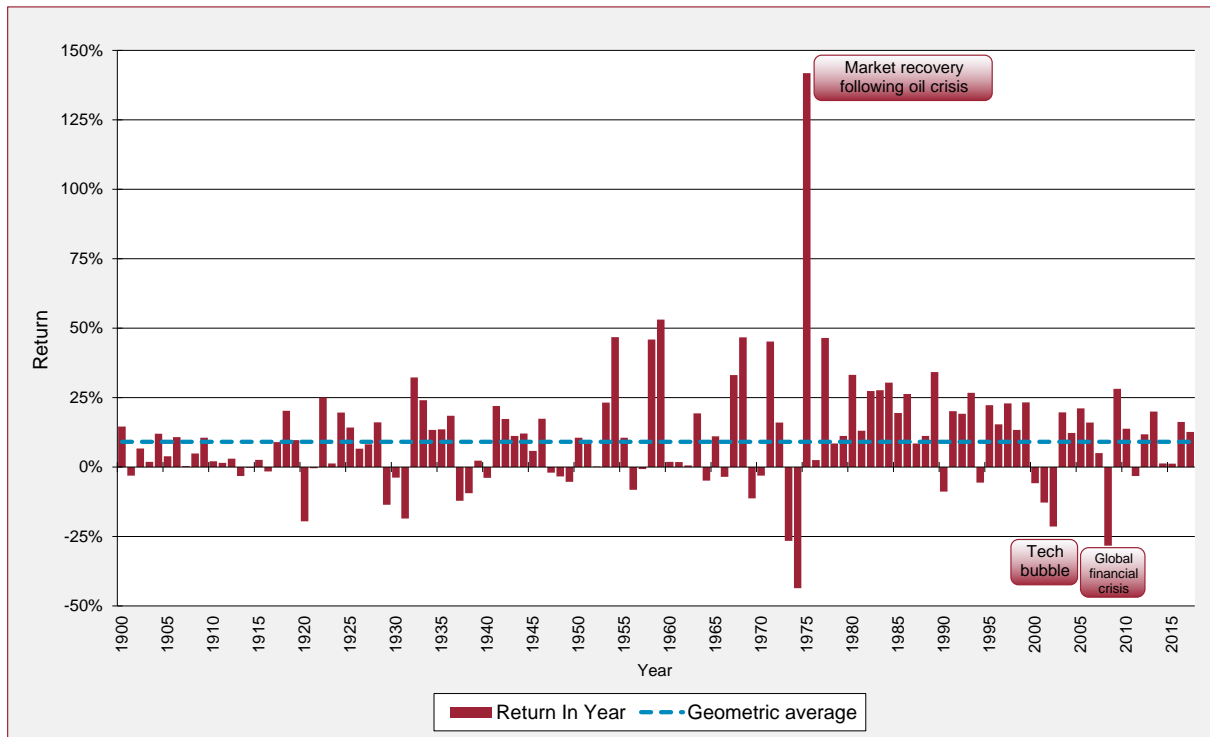
Figure 3 shows the nominal returns on UK equities since 1900<sup>3</sup>.

<sup>2</sup> Strictly speaking, this test for correlation should only be carried out on two independent variables. Given that the Bank of England often cites the rate of inflation as part of its reasoning behind the interest rate decision, these two variables are not entirely independent.

<sup>3</sup> For 2016 and 2017 equities we have used the returns from the FTSE All-Share index as this is what Barclays had been using since 1962.



**Figure 3: UK equity nominal returns since 1900**



Source: Barclays & Courtiers. Returns are total returns.

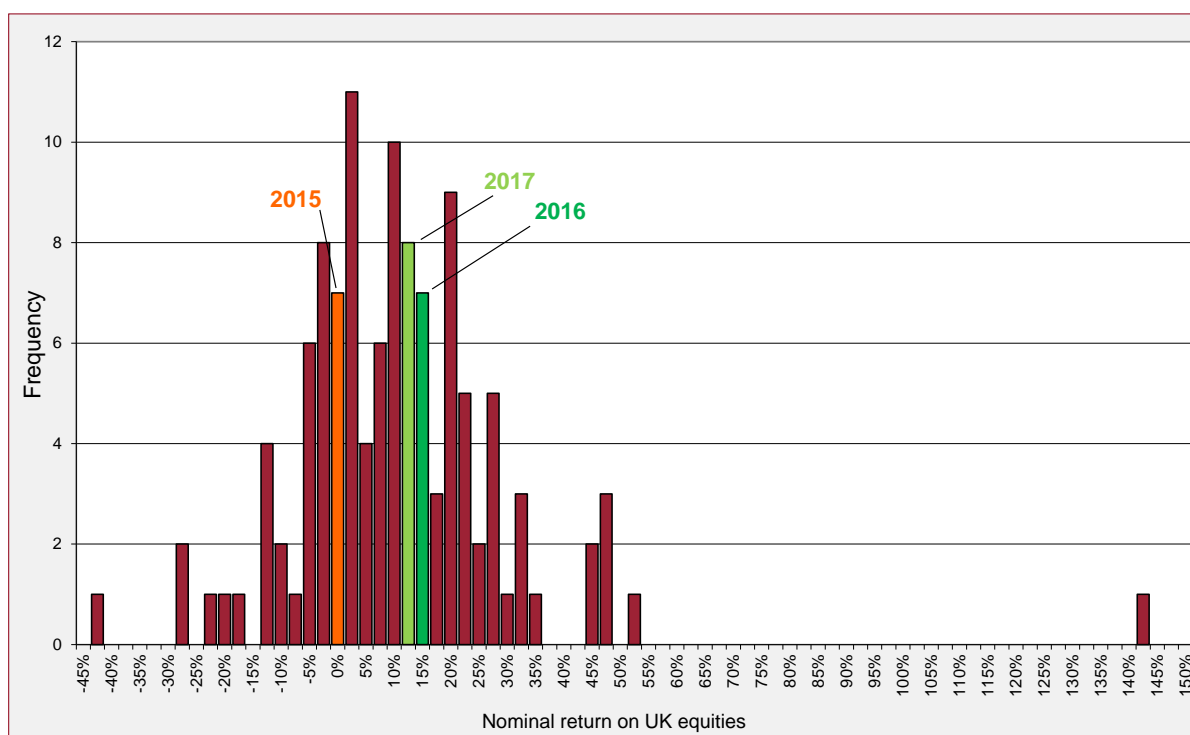
Straight away we can see that volatility was particularly high in the 1970s. In 1973-74 the oil crisis resulted in the worst equity returns of the century, with 1974 enduring a -43.6% collapse. However markets recovered strongly the following year, as they posted a massive gain of +141.8%.

More recently, there were notable negative equity returns during the tech bubble and the global financial crisis. In 2008 equities fell -28.3% before recovering +28.2% in 2009.

Overall, equities have comfortably generated a positive annual return. Figure 4 shows the distribution of these annual returns.



**Figure 4: Distribution of UK equity nominal returns since 1900**



Source: Barclays & Courtiers. Returns are total returns.

The majority of annual equity returns fall between -5% and 20%. Overall, 88 of the last 118 years have had positive equity returns, while 30 have been negative. The chart suggests that annual equity returns closely resemble that of a normal distribution. The massive return in 1975 gives the illusion of a positive skew, but the median return of 10.60% is a tad lower than the arithmetic mean return of 10.73% which suggests the slightest of negative skews.

2015 posted a below average return of +1.2%, largely due to the market sell-off in August of that year.

On paper, one would be forgiven for thinking that 2016 would also be a wobbly year for markets given Britain's decision to leave the EU and the surprise election of Donald Trump as the new US president. However, 2016 ended up being a very positive year for equities as they returned +16.2%. This makes it the 37<sup>th</sup> best year for equities out of the last 118.

2017 also overcame an unexpected general election result and the controversy surrounding Trump's presidency to provide equities with a return of +12.63%, making it the 49<sup>th</sup> best year for them since 1900.

## Gilts

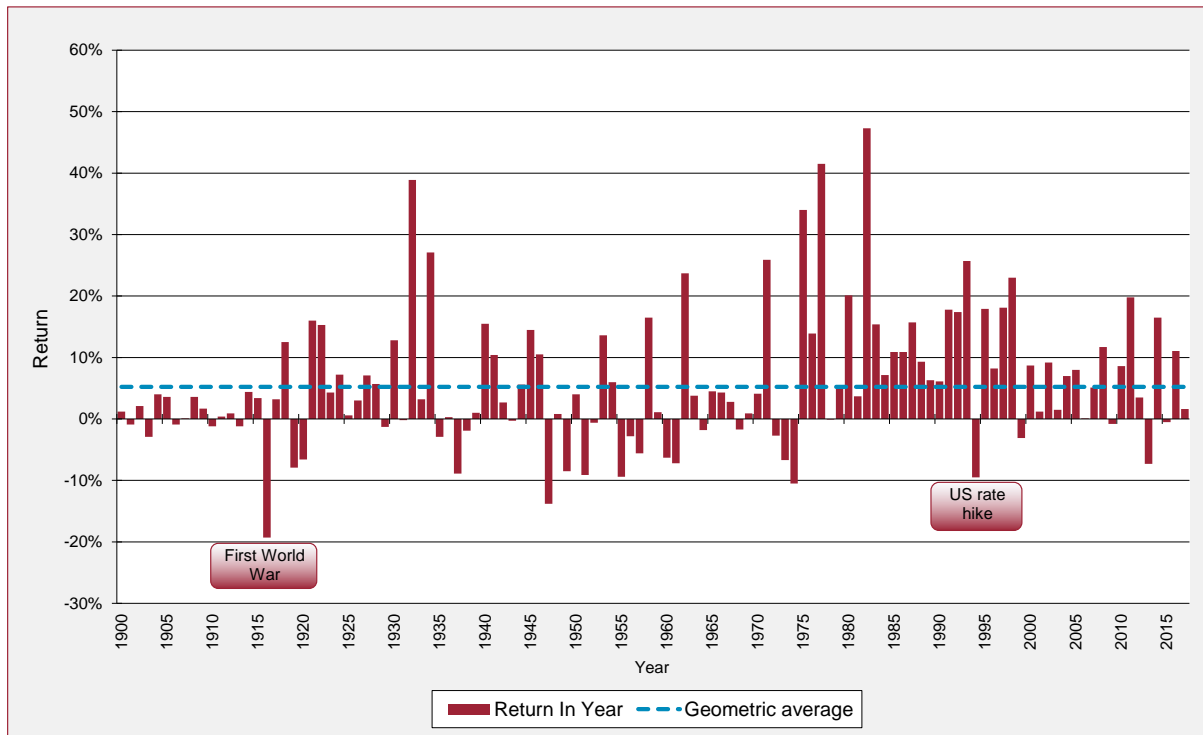
Gilts are UK government bonds, and therefore they are among the less risky of the two asset classes. The UK government has a strong credit rating, having been rated AAA by rating agency Moody's for over 35 years until 2013, when it was downgraded to AA, which is still comfortably investment-grade. As a result, investing in gilts is a particularly safe option, albeit one which won't often earn you a fortune due to low yields a lot of the time.

Figure 5 shows the annual gilt returns since 1900<sup>4</sup>.

<sup>4</sup> Since 1990, Barclays had based their gilt returns on 15-year par yielding gilts. For 2016 and 2017 we have taken a weighted average from the following: FTSE Gilts Under 5 Years Index (25%), FTSE Gilts 5-15 Years Index (25%), FTSE Gilts Over 15 Years Index (50%).



**Figure 5: UK gilt nominal returns since 1900**



Source: Barclays & Courtiers. Returns are total returns.

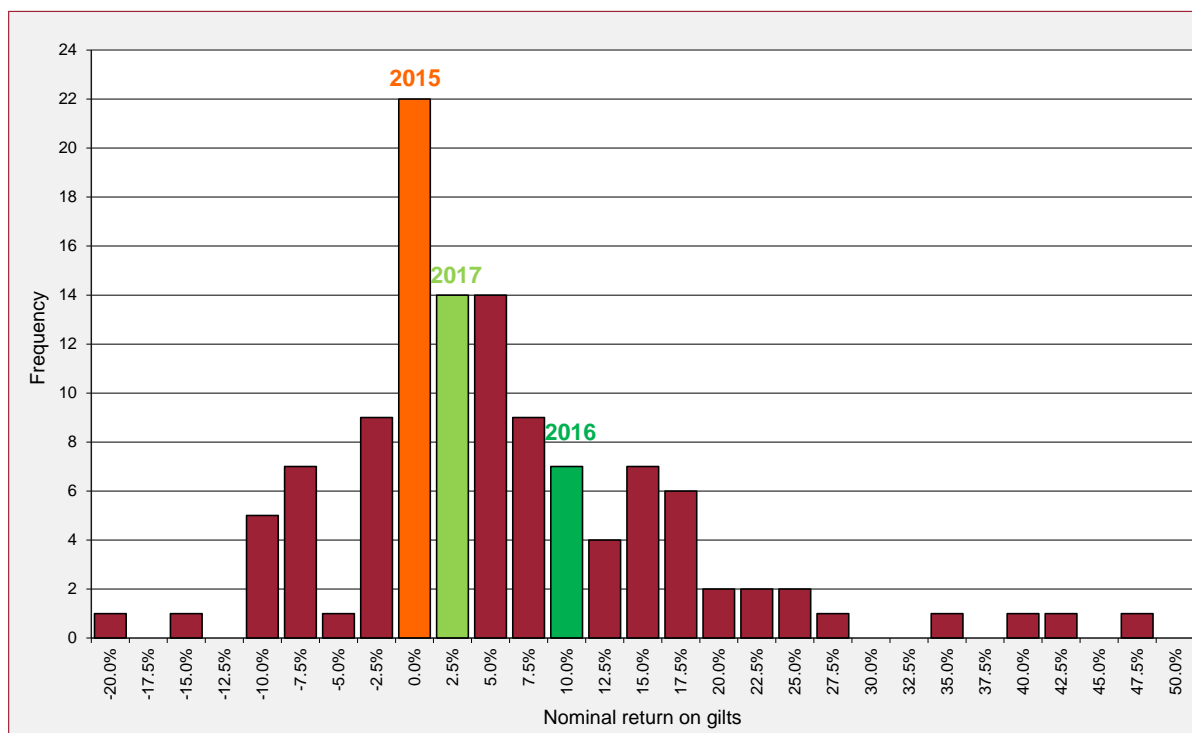
The strongest period for gilts was the 1980s, where the annual return averaged +14.7%, peaking at +47.3% in 1982. The run of positive gilt returns came to a halt in 1994 when bonds were hit by the US rate hike. The worst year for gilts came during the First World War, specifically in 1916, when they shed -19.3%.

Unlike equities, gilts did not collapse during the recent global financial crisis. Instead, they gained +11.7% in 2008 while stocks had their worst year since 1974. However while equities recovered +28.4% in 2009, gilts made a loss of -0.8%. This is a good demonstration of how the two asset classes can provide diversification in a portfolio – something we'll be looking at a bit later.

Figure 6 shows the distribution of annual bond returns since 1900.



**Figure 6: Distribution of UK gilt nominal returns since 1900**



Source: Barclays & Courtiers. Returns are total returns.

Nearly 20% of annual gilt returns over the last 118 years have been between -1.25% and +1.25%. 84 of the last 118 years have been positive for gilts (slightly less than the 88 for equities), while 34 have been negative. The shape of the chart suggests that gilt returns also closely resemble the normal distribution with a positive skew, a notion supported by the median return of 3.65% being lower than the arithmetic mean return of 5.76%.

In 2016 the Bank of England dropped the base interest rate to just 0.25%, the lowest it has ever been, causing bond prices to rise. The overall return on gilts in 2016 was +11.1%, making it their 29<sup>th</sup> most profitable year out of the last 118 – just enough to place it in the top quartile.

Bond returns weren't quite so lucrative in 2017, as the base rate was increased for the first time since 2007 and inflation jumped from 1.6% to 3%. Overall the gilt return during the year was +1.6%, placing it 71<sup>st</sup> out of 118.

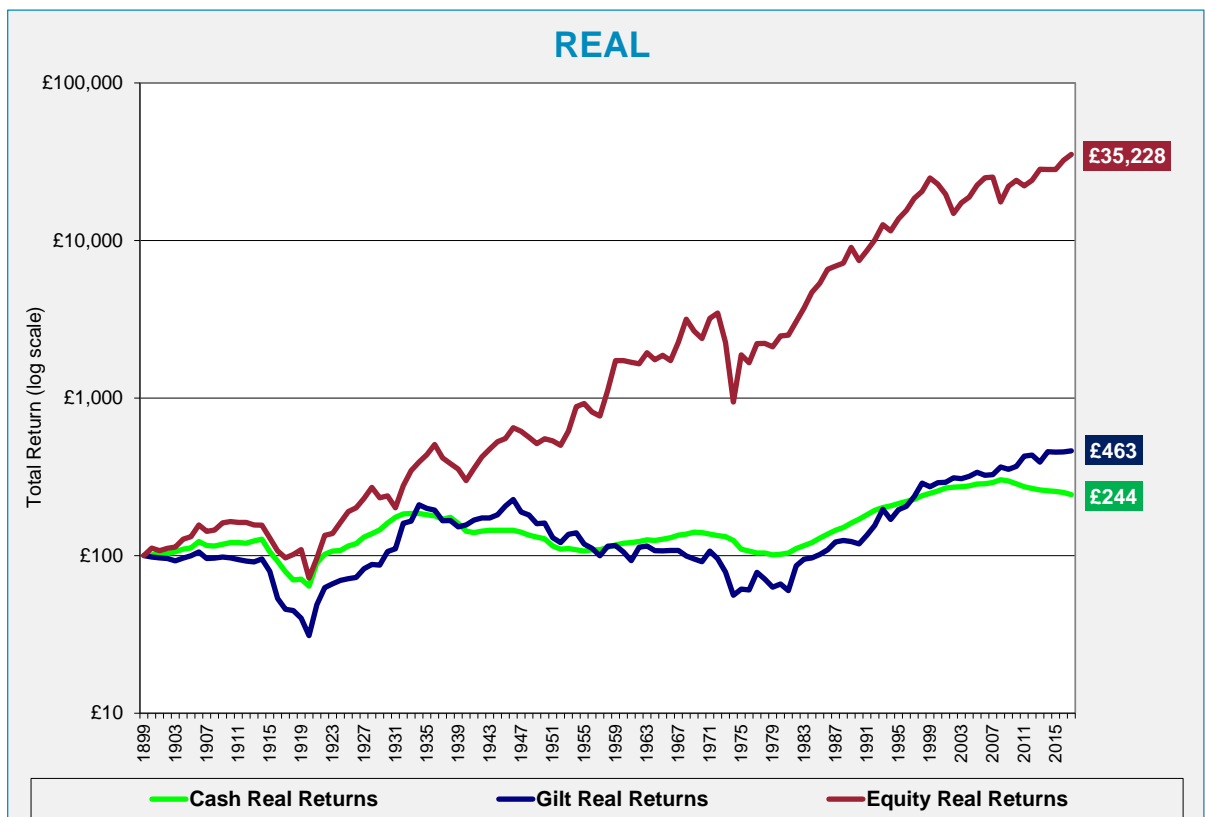
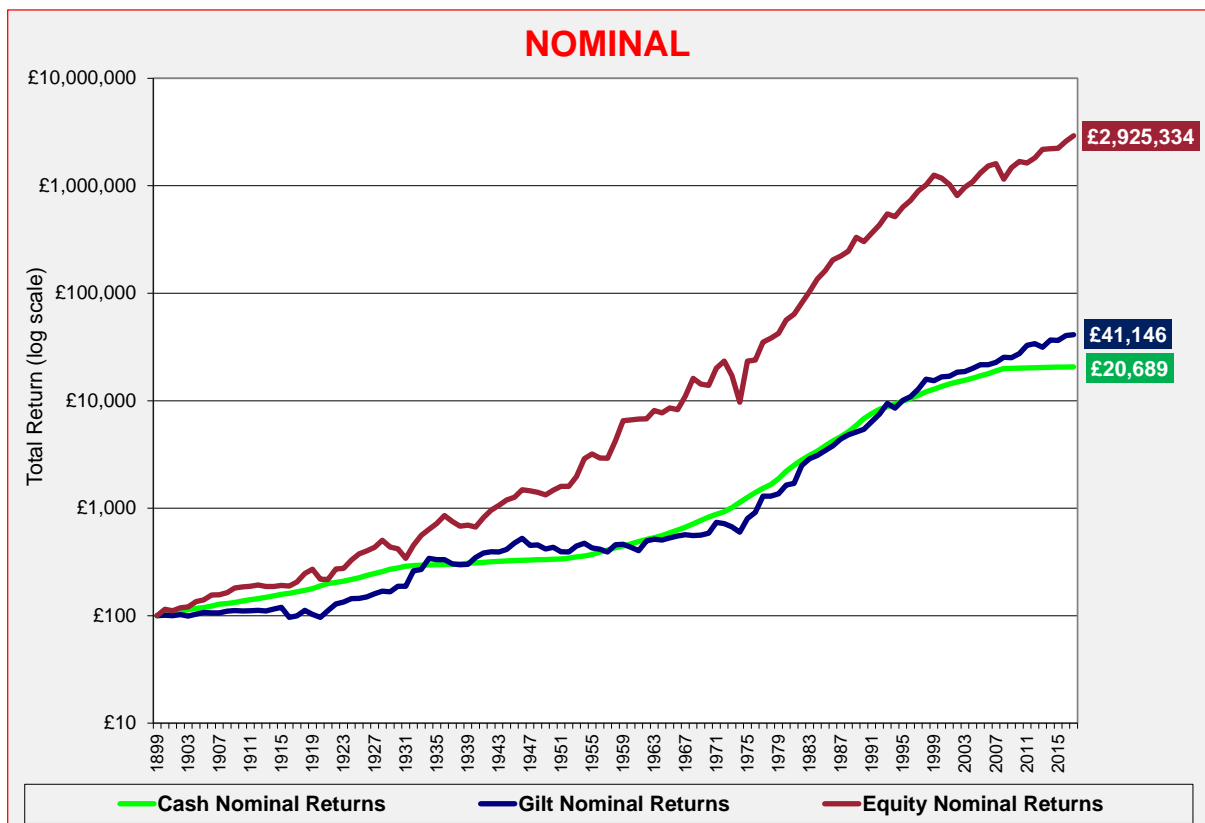
With an average of +13.65%, 2016 was the best year for combined equity and gilt returns since 2009, which had an average of +13.70%.

## Nominal vs. real returns

The charts we have seen so far all display the nominal returns of their respective asset classes. They therefore do not account for inflation, which can dramatically impact the real value of an investment. To illustrate this, Figure 7 shows the changing nominal value of investments in equities, gilts and cash if £100 were invested at the start of 1900. Figure 8 then shows the same illustration but with real values instead of nominal values.



Figures 7 & 8: UK nominal and real returns since 1900



Source: Barclays & Courtiers. Returns are total returns.





As demonstrated by the charts, long term returns are heavily influenced by inflation. £100 invested in equities at the start of 1900 would be worth over £2.9 million at the end of 2017, but if we take into account rising prices it is actually worth just £35,228. However this is still a significant appreciation compared to that of bonds and cash. A £100 investment in UK gilts 118 years ago would be worth £41,146 in nominal terms, but just £463 when adjusting for inflation, while the same investment in cash would be worth £20,689 in nominal terms and a paltry £244 in real terms.

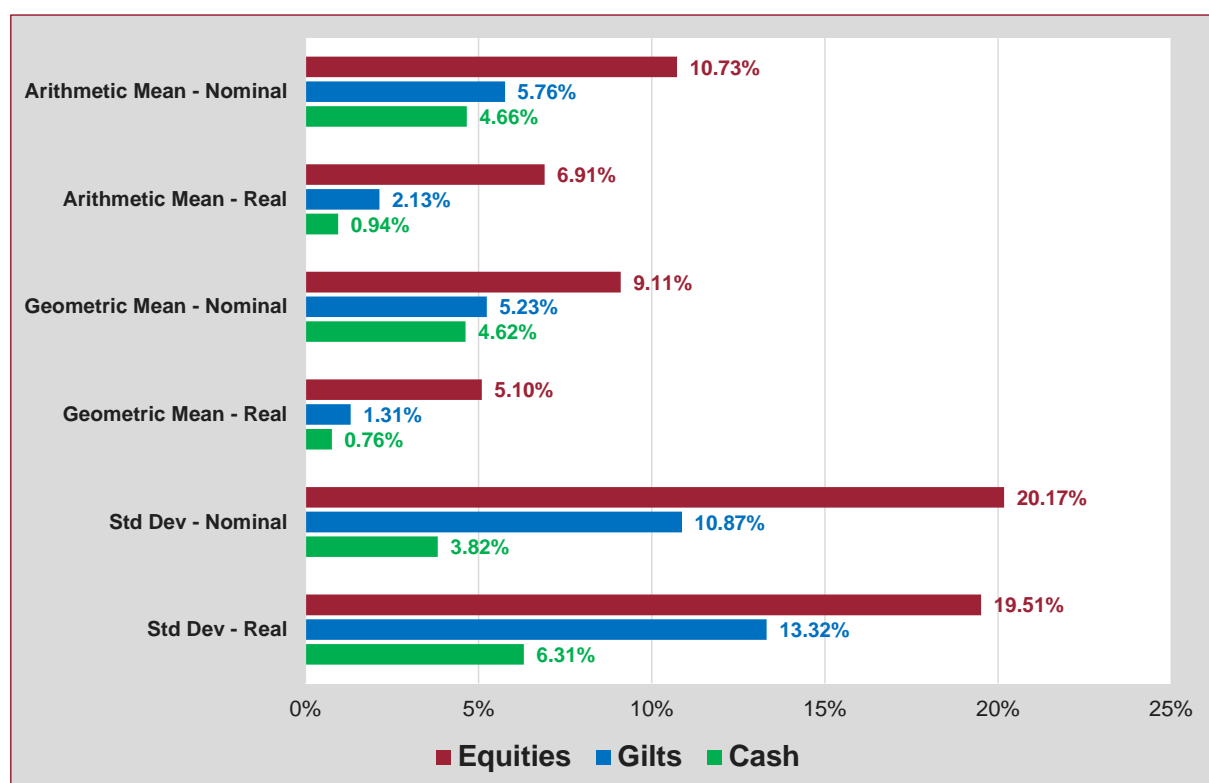
The real return chart shows that the real value of the cash investment has actually declined over the last ten years. This is due to the slashing of interest rates to all-time lows during the financial crisis, meaning that income from cash deposits was lower than the rate of inflation.

## Volatility

It is clear that of the two major asset classes, equities have historically provided superior returns. Now we consider volatility, which is typically measured using standard deviation. This is an indication of how 'spread out' the returns are. If a security has a high standard deviation, then its returns are widely spread and we would therefore consider it to be volatile.

Figure 9 summarises the mean returns and standard deviation of returns of equities, gilts and cash over the last 118 years.

**Figure 9: Mean and volatility of nominal and real returns since 1900**



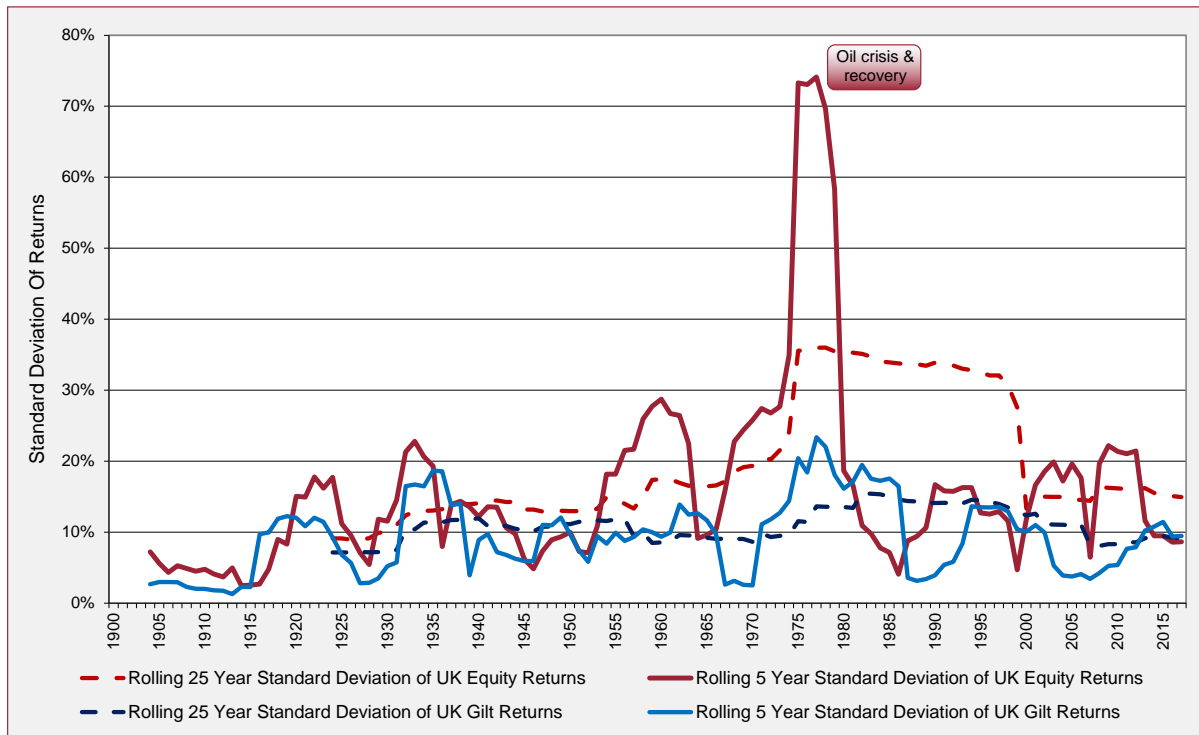
Source: Barclays & Courtiers. Data is based on total returns.

As expected, equities clearly display more volatility on an annual basis than gilts and cash.

As with returns, volatility can rise or fall depending on market conditions. Figure 10 shows the rolling five year and rolling twenty-five year volatility of nominal equity and gilt returns.



**Figure 10: Rolling standard deviation of UK equity and gilt returns**



Source: Barclays & Courtiers. Data is based on total returns.

Throughout most of the last 118 years, the rolling volatility of equities has been higher than that of gilts. The giant peak in the 1970s is another consequence of the oil crisis, with the -43.6% slump in 1974 being followed immediately by a +141.8% return.

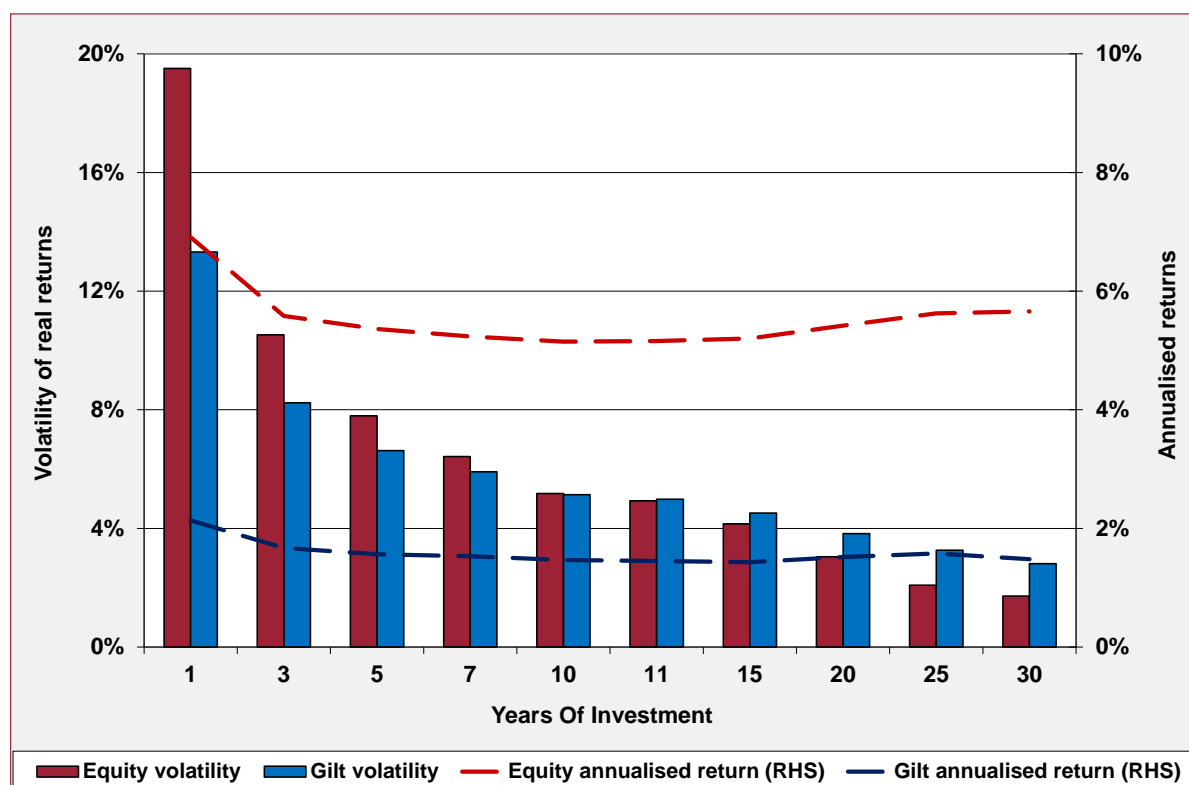
In the years since the global financial crisis, equity returns have been a little more consistent than bond returns, and this is reflected in the rolling five year volatility of equities being slightly lower than that of gilts since 2013.

In Figure 9, the difference in volatility between equities and gilts was lower for real returns than it was for nominal returns. We will now examine this further by looking at the volatility of real returns over various rolling time horizons.

Figure 11 shows the annualised real returns and volatility of real returns over a number of time horizons.



**Figure 11: Volatility and annualised real returns over various time horizons**



Source: Barclays & Courtiers. Data is based on total returns.

As the time horizon increases, the volatility of annualised returns decreases for both asset classes. This is an intuitive result, since outliers such as the +141.8% equity return have a lower weighting in the standard deviation calculation of longer time periods – this is why the twenty-five year volatility in Figure 10 didn't spike as much as the five year volatility.

However, a more surprising result begins to emerge when the time horizon reaches eleven years. The volatility of real equity returns is lower than the volatility of real gilt returns. This is not so intuitive, since we are accustomed to the notion that equities are the riskier asset class. It suggests that when investing over a long time horizon, it is less risky to invest your money in equities. Note that this only holds for real returns, and not for nominal returns.

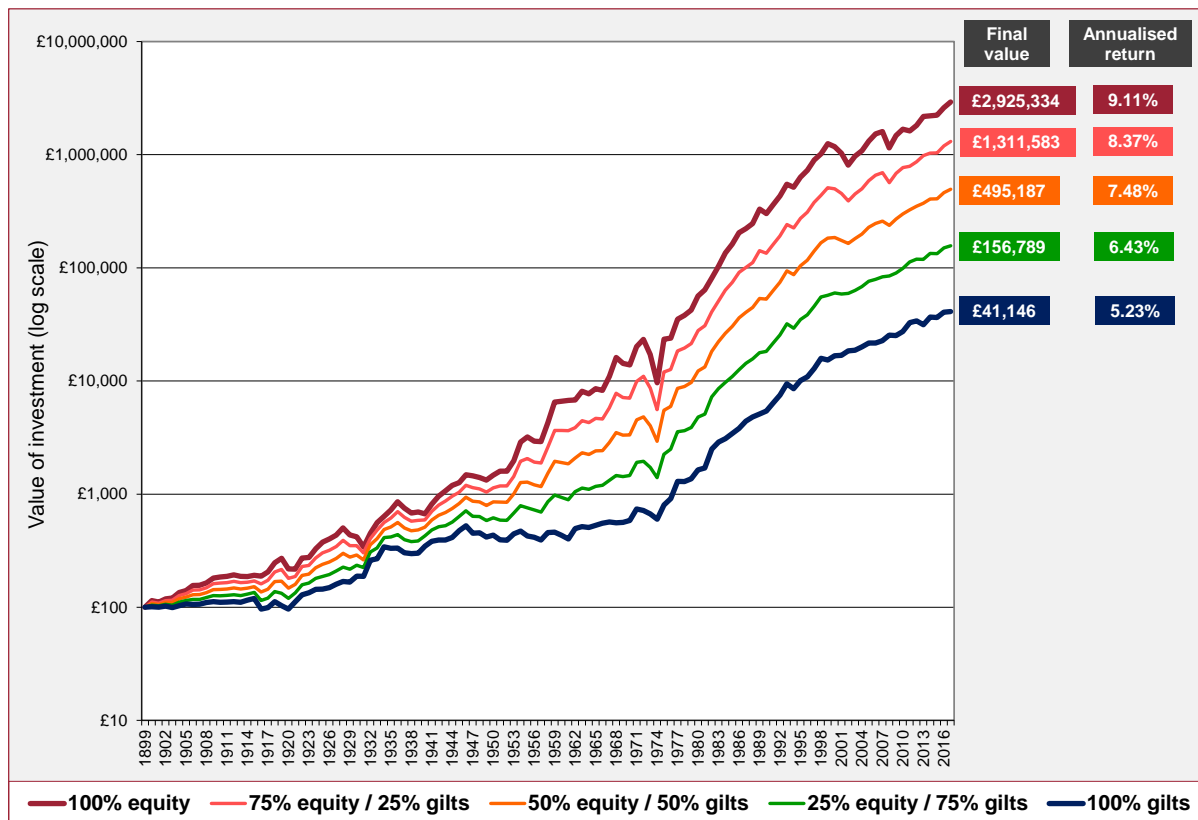
### Diversification

Instead of investing an entire portfolio in equities or gilts, a more sensible approach may be to invest in a combination of the two. This would be in line with modern portfolio theory, which states that diversification between asset classes will reduce overall volatility.

The risk tolerance of an investor would determine the proportion of each asset class they would want to allocate their money to. A higher risk tolerance would enable a greater weighting in equities and therefore a higher potential return. Figure 12 shows what £100 invested at the start of 1900 would amount to at the end of 2017 had it been invested entirely in equities, entirely in gilts or in various combinations of the two.



**Figure 12: Nominal value of £100 invested since 1900 in various portfolios**



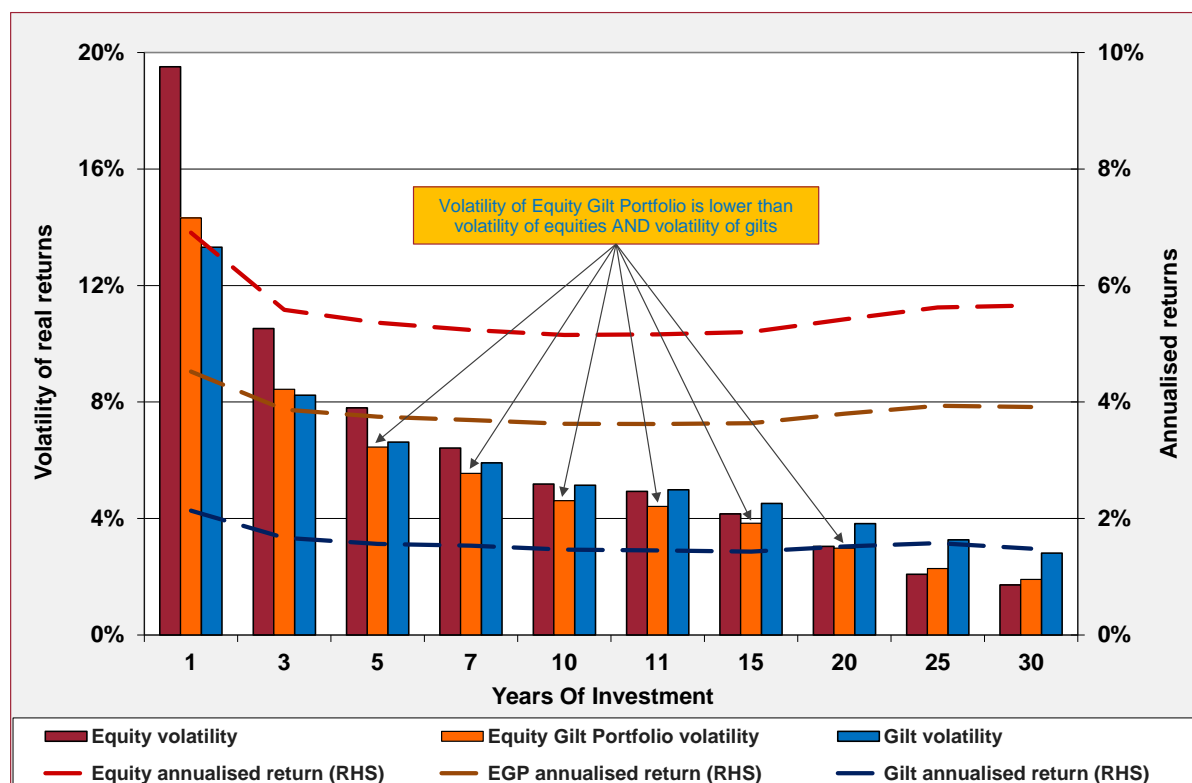
Source: Barclays & Courtiers. Data is based on total returns.

Evidently, increasing the equity weighting in a portfolio results in greater returns over the long run. This chart also demonstrates just how powerful the effects of compounding are. Looking at the 100% equity portfolio and the 75% / 25% portfolio, over 118 years, a mere 0.74% increase in the annualised return results in a final portfolio value that is 123% higher.

But what is the effect on volatility of incorporating both asset classes in a portfolio? If we insert the 50% equity / 50% gilt combination (hereafter referred to as the 'equity gilt portfolio') into the analysis of volatility of real returns over various time horizons (seen previously in Figure 11), then we get the following:



**Figure 13: Volatility and annualised real returns over various time horizons – featuring the equity gilt portfolio**



Source: Barclays & Courtiers. Data is based on total returns.

Here we see that for time horizons of five years to around twenty years, a portfolio containing an equal mix of equities and gilts will exhibit lower volatility of real returns than both a 100% equity portfolio and a 100% gilt portfolio. This phenomenon occurs due to the less than perfect correlation between the two asset classes. The formula for calculating the volatility of a two-asset portfolio is as follows:

$$\sigma_p = \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\rho\sigma_1\sigma_2}$$

- Where:
- $\sigma_p$  = standard deviation of portfolio returns
  - $\sigma_1$  = standard deviation of asset 1 returns
  - $\sigma_2$  = standard deviation of asset 2 returns
  - $w_1$  = weight of asset 1 in portfolio
  - $w_2$  = weight of asset 2 in portfolio
  - $\rho$  = correlation coefficient between the two assets

The key term is the correlation coefficient,  $\rho$ , which can range from -1 to 1. The closer it is to -1, the lower the correlation between the two assets and the greater the diversification benefit that they offer. In our case, the real returns of equities and gilts over the last 118 years have a correlation of 0.505, hence there is some diversification benefit available.



## Risk-adjusted returns

Risk adjusted returns are a means of measuring a portfolio's return given its level of risk. If two portfolios have the same rate of return but one has a lower level of risk then that one has a greater risk-adjusted return. The mostly widely used measure for risk-adjusted returns is the Sharpe ratio, developed in 1966 by American economist William Sharpe. It is calculated as follows:

$$SR = \frac{r_p - r_f}{\sigma_p}$$

Where:

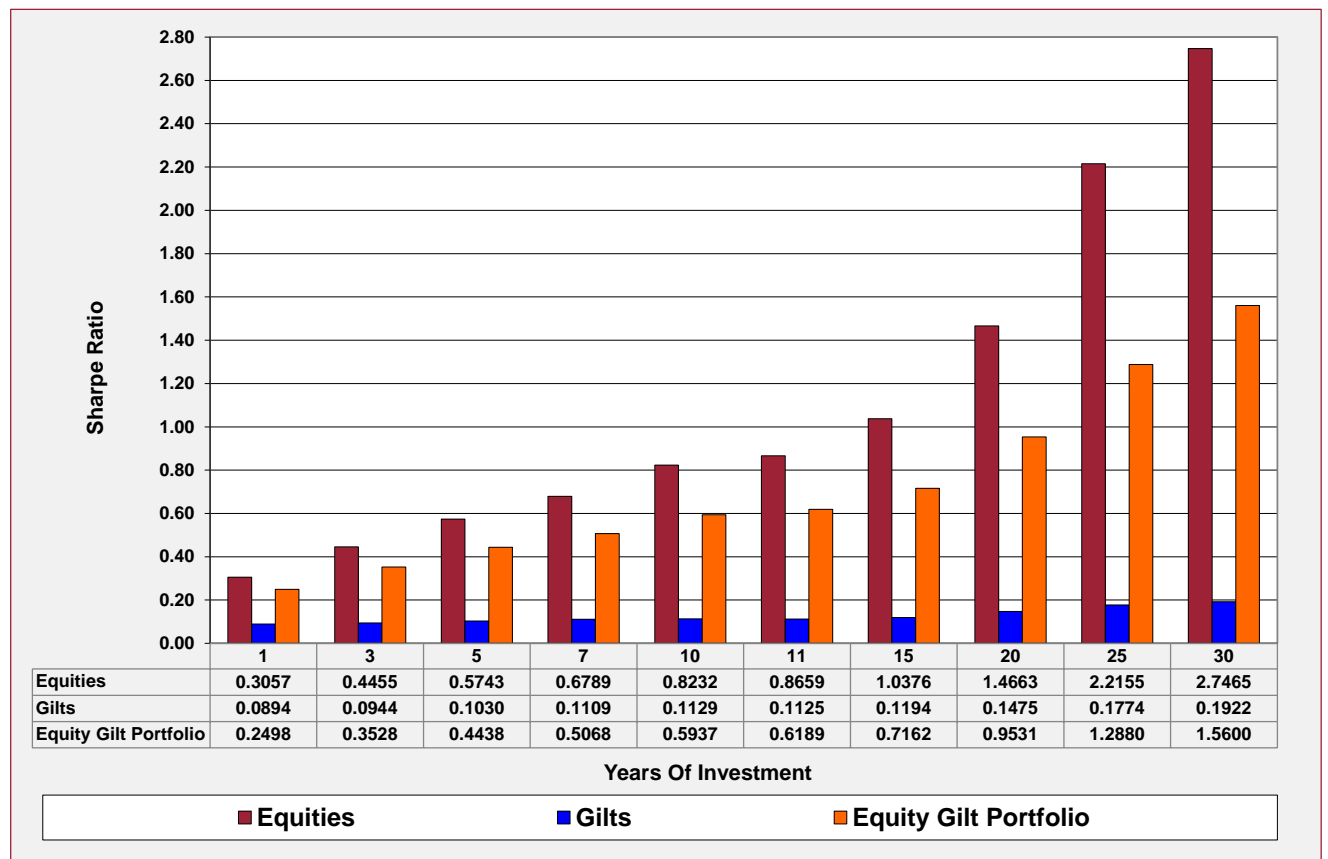
$r_p$  = portfolio overall return

$r_f$  = risk-free return (e.g. the return on cash)

$\sigma_p$  = standard deviation of the portfolio returns

Figure 14 shows the Sharpe ratio over various time horizons for equities, gilts and the equity gilt portfolio.

**Figure 14: Sharpe ratios using real returns**



Source: Barclays & Courtiers. Data is based on total returns.

Equities command far superior risk-adjusted returns to gilts. This is partly because gilt returns are often barely higher than the risk-free rate, which results in a very low numerator in the Sharpe ratio calculation. For the higher time horizons it is also because, as we have seen, long term volatility for real returns is actually lower for equities than it is for gilts.



The equity gilt portfolio also delivers far superior risk-adjusted returns to gilts, but despite this portfolio offering lower overall volatility in some time horizons, as seen in the previous section, it is ultimately equities which consistently provide the greatest return for their level of risk.

This suggests that equities, not bonds, should be the favoured of the two major asset classes. The third richest man in the world and widely regarded as one of the greatest investors of the modern age, Warren Buffett, said earlier this year that he would choose equities over bonds 'in a minute', and it's not difficult to see why.

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**Analyst**

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The majority of raw data for this study was extracted from the 2016 edition of the *Barclays Equity Gilt Study*, with additional data points sourced from Bloomberg. Other sources are listed below:

UK government credit ratings

<https://tradingeconomics.com/united-kingdom/rating>

Warren Buffett

<https://www.cnbc.com/2018/02/26/buffett-when-choosing-between-stocks-and-bonds-i-would-choose-equities-in-a-minute.html>

